Section 01 - Product And Company Information

Product Identifier ....................... Citric Acid 50% Solution

Product Use .............................. Membrane cleaning in water treatment, pipe cleaning, metal oxide deposit removal in boilers

Supplier Name ......................... ClearTech Industries Inc.
1500 Quebec Avenue
Saskatoon, SK. Canada
S7K 1V7

Prepared By ......................... ClearTech Industries Inc. Technical Department
Phone: 1 (800) 387-7503

24-Hour Emergency Phone .......... 1 (800) 387-7503

Section 02 - Composition / Information on Ingredients

Ingredients .......................... Citric Acid 48-52%

CAS Number .......................... Citric Acid 77-92-9

Synonym (s) .......................... 3-Carboxy-3-hydroxypentane-1,5-dioic acid; 2-Hydroxypropanetricarboxylic acid; 2-Hydroxy-1,2,3-propanetricarboxylic acid; 2-Hydroxytricarballylic acid; beta-Hydroxytricarballylic acid; beta-Hydroxy-tricarboxylic acid

Section 03 - Hazard Identification

Inhalation .............................. Aerosols and mists from solutions may cause mild to moderate irritation of the nose and throat. Overexposure could cause coughing, sneezing, and labored breathing.
Skin Contact / Absorption………... This product can cause moderate irritation of the skin. Citric acid may cause allergic contact dermatitis with prolonged or repeated contact in sensitive individuals.

Eye Contact……………………………………………………… Corrosive liquid. Can cause moderate to severe eye irritation such as tearing, stinging, redness and swelling. Concentrated solutions may be corrosive to the eyes and cause corneal ulcerations.

Ingestion………………………………………………………… Citric Acid may cause mild gastrointestinal irritation, with symptoms including nausea, diarrhea, vomiting, and abdominal pain. Concentrated solutions may cause necrotic and ulcerative lesions on oral mucous membranes. Chronic ingestion of high concentration Citric Acid can result in erosion of tooth enamel. Repeated ingestion of this solution can result in sensitization to the sun, causing sunburn.

Exposure Limits……………………………………… ACGIH/TLV-TWA: No exposure limits have been established for any of this product's components.

Section 04 - First Aid Measures

Inhalation……………………………………………………………………………… Remove victim to fresh air. Give artificial respiration only if breathing has stopped. If breathing is difficult, give oxygen. Seek immediate medical attention.

Skin Contact / Absorption………………… Avoid direct contact. Remove contaminated clothing. Wash affected area with soap and water for at least 30 minutes. Seek medical attention if irritation occurs or persists.

Eye Contact………………………………………………………… Contact lenses should never be worn when working with this product. Flush immediately with water for at least 30 minutes. Forcibly hold eyelids apart to ensure complete irrigation of eye tissue. Seek immediate medical attention.

Ingestion…………………………………………………………………….. Seek medical attention. DO NOT induce vomiting. Rinse mouth with water. Do not give anything by mouth if individual is drowsy or unconscious, place individual on left side with head down. Do not leave individual unattended. Seek immediate medical attention.

Additional Information………………….. Pre-existing disorders of skin and lungs may be aggravated with exposure to material.

Section 05 - Fire Fighting Measures

Conditions of Flammability……………… Not flammable.

Means of Extinction………………… Carbon dioxide, dry chemical powder, appropriate foam, water spray or fog.

Flash Point…………………………………………………………… Not applicable
Auto-ignition Temperature……….. Not applicable

Upper Flammable Limit ………….. Not applicable

Lower Flammable Limit…………….. Not applicable

Hazardous Combustible Products… Carbon monoxide and carbon dioxide are normal products of combustion. Incomplete combustion may produce irritating fumes and acrid smoke.

Special Fire Fighting Procedures..... Wear NIOSH-approved self-contained breathing apparatus and protective clothing. Citric acid is corrosive. Do not enter without wearing specialized equipment suitable for the situation. Firefighter's normal protective clothing (Bunker Gear) will not provide adequate protection. Chemical protective clothing (e.g. chemical splash suit) and positive pressure self-contained breathing apparatus (NIOSH approved or equivalent) may be necessary.

Explosion Hazards............... Material is not considered flammable but residue may burn in presence of a strong ignition source after water has evaporated.

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Section 06 - Accidental Release Measures

Leak / Spill.................................. Wear appropriate personal protective equipment. Ventilate area. Stop or reduce leak if safe to do so. Prevent material from entering sewers. Cover spill with soda ash and discard waste into plastic or plastic lined containers. Flush are with water to remove any residue.

Restrict access to area until completion of clean-up. Ensure clean-up is conducted by trained personnel only. Wear adequate personal protective equipment. Extinguish or remove all ignition sources. Notify government occupational health and safety and environmental authorities.

Contain spill with earth, sand, or absorbent material which does not react with spilled material.

SMALL SPILLS OF SOLUTIONS: Soak up spill with absorbent material which does not react with spilled chemical. Put material in suitable, covered, labelled containers. Flush area with water.

Contaminated absorbent material may pose the same hazards as the spilled product.

SMALL SPILLS OF SOLID: Minimize dispersal of dust in air. Shovel into clean, dry, labelled containers and cover. Flush area with water.

LARGE SPILLS: Contact fire and emergency services and supplier for advice.

Deactivating Materials............. Addition of sodium bicarbonate or lime (soda ash) will neutralize Citric Acid and precipitate calcium citrate. Test area of spill with pH paper to assure neutralization.
Section 07 - Handling and Storage

Handling Procedures................. Corrosive liquid. Use proper equipment for lifting and transporting all containers. Use sensible industrial hygiene and housekeeping practices. Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure. Avoid generating mists. Do not breathe vapors or mists. Avoid all contact with skin and eyes. Use this product only with adequate ventilation. Wash thoroughly after handling.

Storage Requirements............... Store in a cool, dry area, out of direct sunlight and away from heat, ignition sources, and incompatibles. Never return contaminated material to its original container. Inspect all incoming containers to make sure they are properly labelled and not damaged. Store in suitable, labelled containers (usually the shipping container). Keep containers closed. Protect from damage. Keep empty containers in a separate storage area. Empty containers may contain hazardous residues.

Section 08 - Personal Protection and Exposure Controls

Protective Equipment

Eyes..................................... Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.

Respiratory............................ Wear a NIOSH-approved respirator for acid vapour.

Gloves.................................. Impervious gloves of chemically resistant material (rubber or PVC) should be worn at all times. Wash contaminated clothing and dry thoroughly before reuse.

Clothing............................... Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing and dry thoroughly before reuse.

Footwear............................... Impervious boots of chemically resistant material should be worn.

Engineering Controls

Ventilation Requirements............. Mechanical ventilation (dilution or local exhaust), process or personnel enclosure and control of process conditions must be provided in accordance with all fire codes and regulatory requirements. Supply sufficient replacement air to make up for air removed by exhaust systems.

Other.................................... Emergency shower and eyewash must be available and tested in accordance with regulations and be in close proximity.
Section 09 - Physical and Chemical Properties

Physical State.............................. Liquid.

Odor and Appearance...................... Colorless to pale yellow liquid with a slight sugar odour.

Odor Threshold.............................. Not available.

Specific Gravity (Water=1).............. 1.23-1.26 @ 20°C

Vapor Pressure (mm Hg, 20°C).......... 11-16mmHg / 1.5-2.1kPa (20°C)

Vapor Density (Air=1)..................... Not available.

Evaporation Rate........................... < 1 (butyl acetate=1)

Boiling Point............................... 104°C

Freeze/Melting Point...................... -10 to -15°C

pH............................................. >/= 2.5

Water/Oil Distribution Coefficient...... Not available

Bulk Density............................... 1.25 (20°C)

% Volatiles by Volume.................... Not available

Solubility in Water........................ Complete

Molecular Formula......................... C_6H_8O_7

Molecular Weight........................... 192.125 g/mol (anhydrous citric acid)

Section 10 - Stability and Reactivity

Stability...................................... Stable under normal conditions.
Incompatibility

STRONG OXIDIZING AGENTS (e.g. perchloric acid, peroxides, chromates, nitric acid) - mixtures may react violently if heated. Increased risk of fire.

STRONG REDUCING AGENTS (e.g. metal hydrides) - may react vigorously or violently.

STRONG BASES (including alkalis such as sodium hydroxide and potassium hydroxide) - mixtures may generate heat and pressure. Increased risk of fire.

METAL NITRATES - a mixture exploded during a vacuum evaporation procedure.

REACTIVE METALS: iron, zinc, aluminum

Hazardous Products of Decomposition.
Carbon monoxide and carbon dioxide are normal products of combustion. Incomplete combustion may produce irritating fumes and acrid smoke.

Polymerization
Hazardous polymerization will not occur.

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**Section 11 - Toxicological Information**

Irritancy
Corrosive liquid. Eye and skin irritant. Persons with pre-existing eye, skin, respiratory, or allergic conditions may be more sensitive.

Sensitization
Citric acid in not known to be a skin or respiratory sensitizer.

Chronic/Acute Effects
Product may cause burns with prolonged contact.

Synergistic Materials
An increased rate of bladder cancer was observed in rats given citric acid (route of administration unspecified) following pre-treatment with oral doses of known bladder carcinogens (compared to those receiving only the known bladder carcinogens). However, these effects were judged to be a secondary effect of increased water consumption and not a direct effect of citric acid exposure. This study was evaluated as valid with restrictions.

Animal Toxicity Data
LD50 (oral, rat): 3000 mg/kg
LD50 (oral, mouse): 5400 mg/kg

Carcinogenicity
Citric acid is not known to be carcinogenic. No human or reliable animal information was located. Citric acid is a normal part of body metabolism and of the human diet.

- The International Agency for Research on Cancer (IARC) has not evaluated the carcinogenicity of this chemical.
- The American Conference of Governmental Industrial Hygienists (ACGIH) has no listing for this chemical.
- The US National Toxicology Program (NTP) has not listed this chemical in its report on carcinogens.
Reproductive Toxicity: Citric acid is not known to cause reproductive toxicity. No human information was located. No reproductive effects were seen in rats or mice orally exposed to citric acid.

Teratogenicity: Citric acid is not known to cause developmental toxicity. No human information was located. No developmental effects were reported in unpublished studies where rats, rabbits or hamsters were orally exposed to citric acid.

Mutagenicity: Citric acid is not known to be mutagenic. No human information was located. Negative results were obtained in tests in live animals, mammalian cells, bacteria and yeast.

Section 12 - Ecological Information

Fish Toxicity: $LC_{50}$ (Lepomis macrochirus, 96hr): 1516 mg/L  
$LC_{50}$ (Leuciscus idus, 96hr): 440-760 mg/L

Algae Toxicity: $EC_0$ (Scenedesmus quadricauda, 7 day): 640 mg/L  
$TLC$(Pavlova lutheri, 7day): 1-300 mg/L

Aquatic Invertebrates Toxicity: $EC_{50}$ (Daphnia magna, 24 hr): 1535 mg/L  
$LC_{50}$ (Carcinus maenas, 48 hr): 160 mg/L

Biodegradability: Readily biodegradable.

Environmental Effects: Due to its physico-chemical characteristics citric acid is highly mobile in the environment and will partition to the aquatic compartment; distribution to soil is of purely temporary nature, while air or sediment constitute negligible sinks. Based on the available data, citric acid is not judged to be a substance that presents a hazard to the environment.

Section 13 - Disposal Consideration

Waste Disposal: Dispose in accordance with all federal, provincial, and/or local regulations including the Canadian Environmental Protection Act.

Section 14 - Transport Information

TDG Classification

Shipping Name: CORROSIVE LIQUID, N.O.S.

Class: 8

Group: III

PIN Number: UN 1760
Other…………………………………..... Secure containers (full and/or empty) with suitable hold down devises during shipment and ensure all caps, valves, or closures are secured in the closed position.

PRODUCT CLASSIFICATION: This product has been classified on the preparation date specified at section 16 of this MSDS / SDS, for transportation in accordance with the requirements of part 2 of the Transportation of Dangerous Goods Regulations. If applicable, testing and/or published test data regarding the classification of this product are listed in the references at section 16 of this MSDS / SDS.

Section 15 - Regulatory Information

WHMIS Classification......................E

NOTE: THE PRODUCT LISTED ON THIS MSDS HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF THE CANADIAN CONTROLLED PRODUCTS REGULATIONS. THIS MSDS CONTAINS ALL INFORMATION REQUIRED BY THOSE REGULATIONS.

NSF Certification................................Product is certified under NSF/ANSI Standard 60 for pH adjustment at a maximum dosage of: 250mg/L [NOTE: product is also NSF certified for use as a membrane cleaner (Designed to be used off-line and flushed out prior to using the system for drinking water, following the manufacturer's instructions].

Section 16 - Other Information

Version #................................. Three
Preparation Date......................... November 19, 2012
Revision Date............................. February 10, 2014, October 23, 2014
Revision Note............................. Third revision: updated technical information.

Note: The responsibility to provide a safe workplace remains with the user. The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment. The information contained herein is, to the best of our knowledge and belief, accurate. However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material. It is the responsibility of the user to comply with all applicable laws and regulations.

Attention: Receiver of the chemical goods / MSDS coordinator

As part of our commitment to the Canadian Association of Chemical Distributors (CACD) Responsible Distribution® initiative, ClearTech Industries Inc. and its associated companies require, as a condition of sale, that you forward the attached Material Safety Data Sheet(s) to all affected employees, customers, and end-users. ClearTech will send any available supplementary handling, health, and safety information to you at your request.
If you have any questions or concerns please call our customer service or technical service department.

References

2) Sigma-Andrich. (2014, July 2). Material Safety Data Sheet: Citric Acid. Oakville, ON.

ClearTech Industries Inc. - Locations

Corporate Head Office: 1500 Quebec Avenue, Saskatoon, SK, S7K 1V7
Phone: 1 (800) 387-7503
Fax: 1 (888) 281-8109
www.ClearTech.ca

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<td>12431 Horseshoe Way</td>
<td>V7A 4X6</td>
<td>800-387-7503</td>
<td>888-281-8109</td>
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<td>Port Coquitlam BC</td>
<td>2023 Kingsway Avenue</td>
<td>V3C 1S9</td>
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<td>Calgary, AB.</td>
<td>5516E - 40th St. S.E.</td>
<td>T2C 2A1</td>
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<td>T5S 1N7</td>
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<td>S7L 5Z3</td>
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<td>888-281-8109</td>
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<tr>
<td>Mississauga, ON.</td>
<td>355 Admiral Blvd Unit #1</td>
<td>L5T 2N1</td>
<td>800-387-7503</td>
<td>888-281-8109</td>
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24 Hour Emergency Number - All Locations – 1(306) 664-2522
Alternative - 1(800) 387-7503